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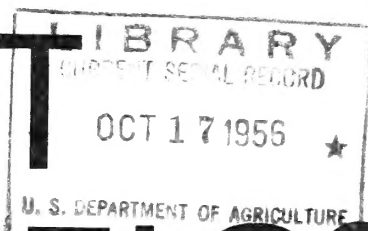
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july 1956

FOREST STATISTICS



Central States Forest Experiment Station

Columbus, Ohio

FOREWORD

This is a preliminary report on the forest areas and timber volumes in Iowa. A second more comprehensive report is being prepared which will contain background material and a brief analysis of the timber situation including figures on timber growth and cut.

These publications are products of the nationwide Forest Survey being made by the Forest Service, U. S. Department of Agriculture. The preliminary planning and a large part of the field work for the survey were done by personnel of the Central States Forest Experiment Station at Columbus, Ohio. The data were analyzed and the report prepared at the Lake States Forest Experiment Station at Saint Paul, Minnesota.

The Forest Survey in Iowa was intensified beyond national standards of accuracy through the cooperation of two state agencies. The State Conservation Commission and the Iowa Agricultural Experiment Station furnished foresters to help in the field inventory, thereby permitting the measurement of double the number of ground plots originally planned. Acknowledgment for this assistance is due to Bruce Stiles, Director of the State Conservation Commission; M. A. Ellerhoff, Superintendent of Forestry; Dr. George Browning, Associate Director of the Iowa Agricultural Experiment Station; and Professor George Hartman, Head of the Department of Forestry.

Complete aerial photo coverage of the State was loaned by the Iowa Agricultural Stabilization Committee at Des Moines.

Field work in Iowa was done during the period November 1953 to August 1954. From initial planning to final compilation these people worked on the inventory:

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Report -- J. T. Morgan, L. F. Compton

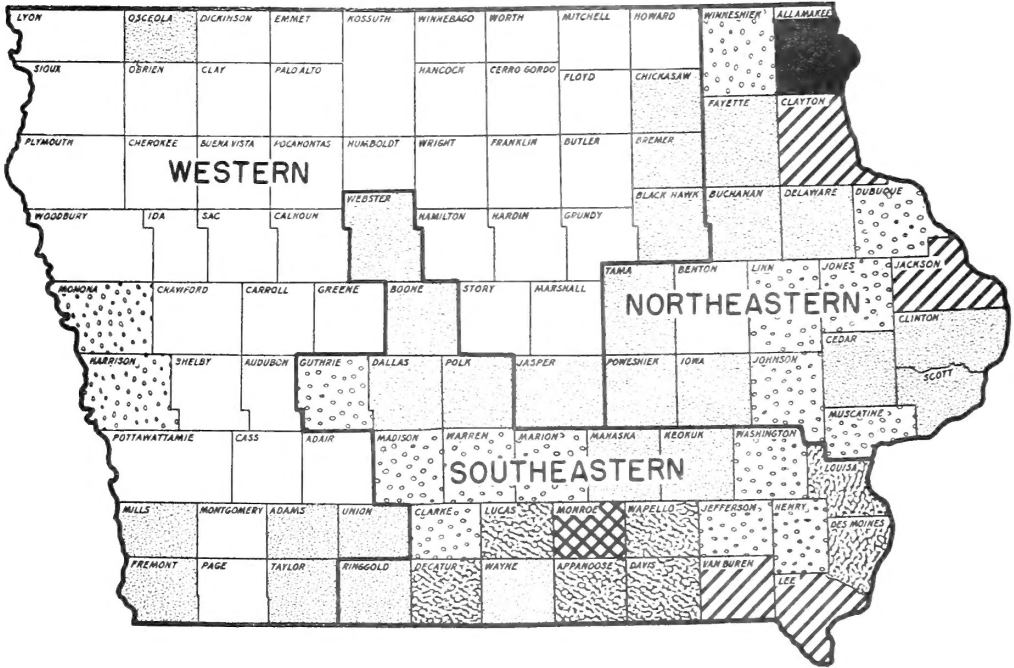
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W. G. McGinnies, Director

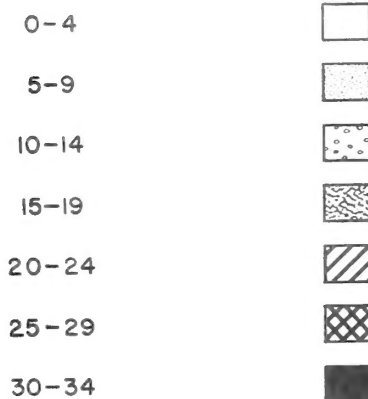
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IOWA



PERCENT FOREST



Frontispiece.--Forest Survey Regions and percent of forest land by county in Iowa.



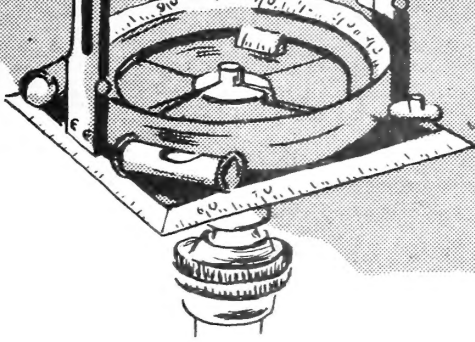
Forest Areas and Timber Volumes of IOWA

This report contains forest area and timber volume statistics for the State of Iowa. The information presented here was gathered and compiled according to three different geographical units, the divisions being made on the basis of similar forest, soil, and economic conditions (frontispiece). So, for the benefit of those who might find such localized information useful, forest statistics are shown separately for each of these units as well as for the State as a whole.

Northeastern Iowa contains most of the soils that developed under forest cover. In the rugged uplands around McGregor are the remaining stands of northern hardwoods and remnants of the outliers of northern softwood species, such as white pine and balsam fir. Because of its rough topography and generally shallow, rather acid soils, much of the land in this area has remained in forest. The forests occur as typical farm woodlots, which are relegated to the poorer ground, and on the rough breaks and bottomlands bordering streams. Exceptions may be found, particularly on the bluffs along the Mississippi River where there are fairly extensive tracts of continuous forest. The amount of forest land by county ranges from 32 percent in Allamakee County to 4 percent in Benton County, which is well into the area of prairie soils.

Southeastern Iowa includes the remaining soils that developed under forest cover, largely along streams. The soils in this region, partly because they are older, have been more affected by leaching and erosion and are less suited to row crops than the rest of the prairie. Farming is shifting from grain to permanent pasture for livestock production. The forests contain fewer valuable species and lower volumes per acre than the rest of the State. The amount of forest area ranges from 26 percent in Monroe County to 6 percent in Webster County. Much tree planting has been done for windbreaks and to halt erosion on old fields.

Western Iowa includes soils that are mostly of recent glacial origin, all of which developed under prairie vegetation. Forests are confined almost entirely to the watercourses. Much timber exists in "stringers" of trees along small drainages too narrow or small in area to qualify as forest land. On the loess soils of the Missouri River bluffs, bur oak grows in pure stands but consists mostly of small, scattered trees with little timber volume. Bottomland hardwoods -- cottonwood, American elm, and silver maple -- are the predominant species throughout the prairie. Forest area averages 3 percent of total land area, rising as high as 11 percent along the Missouri River where the bur oak forests may be increasing in area.



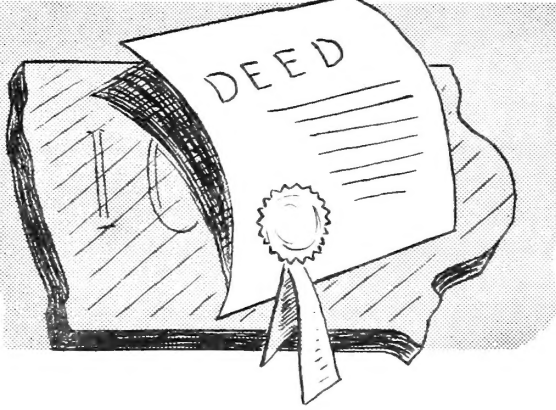
FOREST AREA

Seven percent of Iowa's 36 million acres of land area is forested. All but 25 thousand acres of this 2.6 million acres of forest is classed as commercial forest land.^{1/} The State owns 23 thousand acres on which timber cutting is restricted -- in parks and other recreation areas -- and the other 2 thousand acres of noncommercial forest are in other public ownerships.

Table 1.--Land and forest area by section

Section	: Total :		Forest area		
	: land :	Total	: Percent :	Commer-	: Noncom-
	: area :		: forest :	cial	: mercial
	<u>Thousand</u> <u>acres</u>	<u>Thousand</u> <u>acres</u>		<u>Thousand</u> <u>acres</u>	<u>Thousand</u> <u>acres</u>
Northeast	7,634	852	11	846	6
Southeast	8,682	1,138	13	1,127	11
West	19,553	630	3	622	8
State	35,869	2,620	7	2,595	25

^{1/} For a definition of forest land see page 53.



OWNERSHIP

More than 98 percent of the commercial forest land is privately owned. Farmers own more than 2 million acres -- 88 percent of the total -- and other private owners hold 276 thousand acres for industrial, investment, recreation, and other uses. The State owns 22 thousand acres, largely in state forests, and the federal government owns about 13 thousand acres. Counties and municipalities own hardly any commercial forest land.

Table 2.--Ownership of commercial forest land by section
(In percent)

Ownership	:	State	:	Northeast	:	Southeast	:	West
	:		:	section	:	section	:	section
	:		:		:		:	
Federal		0.5		1.1		0.4		--
State, county, municipal		1.0		.9		1.1		0.5
Farm		87.9		90.3		85.6		88.9
Other private		10.6		7.7		12.9		10.6
All owners		100.0		100.0		100.0		100.0

FOREST TYPES



Two forest types predominate -- the elm-ash-cottonwood, typical of the stream borders; and the oak-hickory, typical of the uplands. These two types make up 87 percent of the commercial forest land. Both types include many sub-types and a wide range of species. The elm-ash-cottonwood type includes stands of cottonwood, American elm, silver maple, white ash, willow, boxelder, and other bottomland species. The oak-hickory type (above) includes other upland species such as hard maple and basswood.

The bur oak type, found both on bottomland sites and on the drier "islands" in the wet prairie, occupies 8 percent of the forested area. This type is more common in western Iowa where it occurs on rough land and comprises 21 percent of the forest area. The maple-birch or northern hardwood type is insignificant in area except in the northeast where it occupies 8 percent of the forest land. This type contains some of the best species, such as northern red oak and basswood. The hardwood-redcedar type, including pure stands of eastern redcedar on dry sites, occurs throughout the State and is considered a sub-type of oak-hickory. Aspen-birch is a very minor type in Iowa, confined almost entirely to the northeastern part of the State.

Table 3.--Forest area by forest types and section
(In percent)

Forest type	State	Northeast section	Southeast section	West section
Oak types	49	49	55	39
Elm-ash-cottonwood	47	41	45	59
Maple-birch and aspen	4	10	--	2
All types	100	100	100	100

STAND - SIZES



A little less than 40 percent of the commercial forest area bears sawtimber stands which contain 1,500 or more board-feet per acre of merchantable sawlog material. Three-fourths of this sawtimber acreage is in large sawtimber stands (above), i.e. more than half of the volume is in trees 15 inches or larger in diameter. Poletimber stands occupy 32 percent of the forest area; seedling and sapling stands 11 percent. More than 18 percent (472 thousand acres) is in nonstocked stands, which have little or no volume at present and little prospect for much in the future unless protected from grazing.

Table 4.--Forest area by stand-size classes and section
(In percent)

Stand-size class	:	State	:	Northeast	:	Southeast	:	West
	:		:	section	:	section	:	section
Large sawtimber	:	29	:	37	:	20	:	33
Small sawtimber	:	10	:	16	:	9	:	6
Poletimber	:	32	:	29	:	35	:	30
Seedlings & saplings and nonstocked	:	29	:	18	:	36	:	31
All classes	:	100	:	100	:	100	:	100

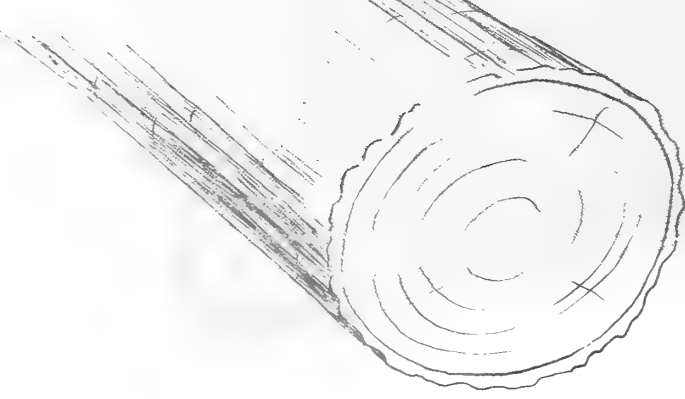


SPECIES

The total sawtimber volume in Iowa is 5.1 billion board-feet. Two-thirds of it is in large sawtimber stands, about one-sixth is in small sawtimber stands, and about one-tenth is in poletimber stands. The sawtimber volume is dispersed among a great variety of species, some much more valuable than others. American elm, a soft hardwood species with few present uses, accounts for 15 percent of the volume. Next is cottonwood, a more favored tree, with 12 percent. The elm-ash-cottonwood type contains 56 percent of all sawtimber volume. Northern red oak and white oak, two of the best hardwood species, each have 10 percent of the volume, and silver maple has 9 percent.

Table 5.--Sawtimber volume, by species and section
(In percent)

Species	:	:	:	:	:
	State	Northeast	Southeast	West	
	:	section	section	section	:
Oaks	32	36	38	20	
Elms	21	19	23	23	
Cottonwood	12	8	7	24	
Maple	11	10	12	12	
Basswood	7	8	5	6	
Walnut	4	4	4	3	
Other	13	15	11	12	
All species	100	100	100	100	



LOG GRADES

The board-foot volume is well distributed among tree-size classes. Seventy percent is in trees 15 inches or larger in d.b.h., including 40 percent in trees 19 inches and larger. Despite the volume in the larger diameter classes, only 31 percent of the sawlog volume is in grade 1 and 2 logs which provide most of the clear material needed by the hardwood industries. The oaks in general run heavily to low-grade logs. On the other hand, cottonwood, black walnut, and American elm contain more high-grade volume than the average.

Table 6.--Sawtimber volume by log grade and section
(In percent)

Log grade	:	State	:	Northeast	:	Southeast	:	West
	:		:	section	:	section	:	section
No. 1	:	12	:	8	:	10	:	17
No. 2	:	19	:	16	:	19	:	26
No. 3 and tie & timber logs	:	69	:	76	:	71	:	57
Total	:	100	:	100	:	100	:	100

TOTAL VOLUME



The sawtimber stands average 4,230 board-feet per acre, while the average for all stands is a little less than 2,000 board-feet. With a reasonable degree of management these average volumes could be greatly increased -- probably doubled. Stand composition could benefit by the removal of overmature, poor-quality, and cull trees.

Table 7.--Volume per acre by section

Class of material	State	Northeast section	Southeast section	West section
Sawtimber (board-feet)	1,962	2,530	1,441	2,135
All growing stock (cubic feet)	533	667	420	554

The total growing stock volume in Iowa is 1,382 million cubic feet. Seventy-six percent of it is in sawtimber trees; 24 percent is in poletimber trees. The average volume per acre is 533 cubic feet. In addition to the growing stock, there is an average of 233 cubic feet, or about 3 1/2 cords of sound wood in cull trees and the limbs of sawtimber trees per forest acre. The volume of such wood in sawtimber stands averages much higher.

STATE AND SECTIONAL TABLES

IOWA - STATE

Table 8.--Forest and nonforest area by county, 1954

Region	: Total : land area ^{1/} :	:	Forest area	:	Nonforest area	
	<u>Thousand acres</u>		<u>Thousand acres</u>	<u>Percent</u>	<u>Thousand acres</u>	<u>Percent</u>
Northeastern	7,634		852	11	6,782	89
Southeastern	8,682		1,138	13	7,544	87
Western	19,553		630	3	18,923	97
State	35,869		2,620	7	33,249	93

^{1/} Source: Area of the United States, 1950. United States Bureau of the Census. Does not include areas listed as inland water.

IOWA - STATE

Table 9.--Commercial forest area by ownership class, 1954

Ownership class	:	Commercial forest area ^{1/}
	:	
	<u>Thousand</u> <u>acres</u>	<u>Percent</u>
Federal:		
National Forest	3	0.1
Indian	1	(<u>2/</u>)
Other	9	.4
Total federal	13	.5
State	22	.9
County and Municipal	2	.1
Private:		
Farm	2,282	87.9
Industrial and other	276	10.6
Total private	2,558	98.5
All ownerships	2,595	100.0

^{1/} Does not include 1,000 acres of forest land in federal ownership, 23,000 acres in State ownership, and 1,000 acres in county and municipal ownership which are reserved from commercial timber use.

^{2/} Less than 0.05 percent.

IOWA - STATE

Table 10.--Commercial forest area by forest type and
stand-size class, 1954
(In thousands of acres)

Forest type	:	Total	:	Large : sawtimber: stands	Small : sawtimber: stands	Pole-: timber: stands	Seedling & sapling stands ^{1/}
<u>Percent</u>							
Elm-ash-cottonwood	1,219	47.0	444	100	323	352	
Oak-hickory	1,036	39.9	220	131	385	300	
Bur oak	202	7.8	30	13	78	81	
Maple-birch	78	3.0	44	19	10	5	
Hardwood-redcedar	40	1.5	--	--	24	16	
Aspen-birch	20	.8	--	5	10	5	
All types	2,595	100.0	738	268	830	759	
Percent	100.0		28.4	10.3	32.0	29.3	

^{1/} Includes nonstocked and other areas.

IOWA - STATE

Table 11.--Sawtimber volume on commercial forest area by species
and stand-size class, 1954
(In million board-feet)

Species	Total	Percent	Large sawtimber stands	Small sawtimber stands	Pole- timber stands	Seedling & sapling stands ^{1/}
Eastern redcedar	6	0.1	--	1	2	3
Black ash	39	.8	34	4	1	--
American elm	742	14.6	469	92	99	82
Slippery elm	330	6.5	239	50	29	12
Aspen	15	.3	1	14	--	--
Cottonwood	601	11.8	527	48	19	7
Basswood	342	6.7	256	37	25	24
Silver maple	462	9.1	375	73	12	2
Sycamore	9	.2	9	--	--	--
Boxelder	23	.4	11	3	5	4
Butternut	23	.4	15	6	1	1
Black cherry	23	.4	10	5	4	4
Hackberry	29	.6	24	4	1	--
Willow	130	2.6	36	31	34	29
Other soft hardwoods	11	.2	8	2	1	--
White oak	504	9.9	253	141	66	44
Bur oak	360	7.1	196	65	59	40
Other white oaks	23	.4	16	6	1	--
Black oak	96	1.9	33	49	6	8
Northern red oak	532	10.4	378	108	38	8
Other red oaks	135	2.7	73	27	17	18
Hickory	155	3.0	52	48	39	16
White ash	161	3.2	116	21	2	22
Sugar maple	98	1.9	85	9	1	3
River birch	37	.7	33	1	3	--
Black walnut	193	3.8	100	61	23	9
Other hard hardwoods	13	.3	2	--	9	2
All species	5,092	100.0	3,351	906	497	338
Percent	100.0		65.8	17.8	9.8	6.6

^{1/} Includes the volume on nonstocked and other areas.

Table 12.--Sawtimber volume on commercial forest area by species and tree-diameter class, 1954
(In million board-feet)

Species	Total	Tree-diameter class (inches)						
		12-14	16-18	20-22	24-26	28-30	32+	
Eastern redcedar	6	1/6	--	--	--	--	--	--
Black ash	39	11	21	7	--	--	--	--
American elm	742	182	228	158	83	30	61	61
Slippery elm	330	103	113	61	14	39	--	--
Aspen	15	11	4	--	--	--	--	--
Cottonwood	601	53	85	89	110	95	169	169
Basswood	342	99	135	76	15	7	10	10
Silver maple	462	86	124	142	61	24	25	25
Sycamore	9	--	--	--	--	9	--	--
Boxelder	23	15	6	--	2	--	--	--
Butternut	23	11	10	2	--	--	--	--
Black cherry	23	17	6	--	--	--	--	--
Hackberry	29	9	7	2	4	7	--	--
Willow	130	75	38	5	12	--	--	--
Other soft hardwoods	11	6	5	--	--	--	--	--
White oak	504	198	166	85	24	24	7	7
Bur oak	360	137	106	56	37	19	5	5
Other white oaks	23	7	7	2	--	7	--	--
Black oak	96	33	33	18	--	12	--	--
Northern red oak	532	147	174	124	54	16	17	17
Other red oaks	135	51	31	22	23	--	8	8
Hickory	155	108	43	4	--	--	--	--
White ash	161	46	34	26	8	47	--	--
Sugar maple	98	35	26	18	9	10	--	--
River birch	37	6	13	7	11	--	--	--
Black walnut	193	85	76	23	9	--	--	--
Other hard hardwoods	13	3	10	--	--	--	--	--
All species	5,092	1/1,540	1,501	927	476	346	302	302
Percent	100.0	30.2	29.5	18.2	9.4	6.8	5.9	5.9

1/ Includes 10-inch softwood sawtimber.

IOWA - STATE

Table 13.--Hardwood sawtimber volume by species group and log grade, 1954

Species group	Total volume	Log grade 1			Log grade 2			Log grade 3			Tie and timber grade	
		Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent	board- feet
American elm	1,072	147	14	214	20	414	38	297	28			
Cottonwood	601	172	29	118	19	167	28	144	24			
Silver maple	462	44	9	74	16	156	34	188	41			
White oaks ^{1/}	527	27	5	116	22	159	30	225	43			
Bur oak	360	--	--	78	22	51	14	231	64			
Red oaks	763	25	3	86	11	289	38	363	48			
Hickory	155	--	--	8	5	75	49	72	46			
Black walnut	193	32	17	53	27	97	50	11	6			
Other hardwoods	953	137	14	234	25	317	33	265	28			
All hardwoods	5,086	584	12	981	19	1,725	34	1,796	35			

^{1/} Includes all white oaks except bur oak.

IOWA - STATE

Table 14.--Total cubic volume of sound material on commercial forest area by species and class of material, 1954
(In million cubic feet)

Species	: Total : sound : material	: Growing stock				: Other material		
		: Sawtimber trees				: Cull		
		: Total: Sawlog				: Total: trees		
		: portion				: 2/		
			Upper	stem	tim-		limbs	
			1/		ber		3/	
Eastern redcedar	3.8	3.8	1.0	0.2	2.6	--	--	--
Black ash	13.1	11.4	6.4	1.4	3.6	1.7	0.6	1.1
American elm	321.9	206.6	115.1	45.4	46.1	115.3	45.1	70.2
Slippery elm	125.7	88.2	51.0	16.3	20.9	37.5	16.5	21.0
Aspen	17.2	15.0	2.7	.6	11.7	2.2	1.7	.5
Cottonwood	154.1	120.4	92.2	23.3	4.9	33.7	2.9	30.8
Basswood	111.3	83.0	55.0	15.6	12.4	28.3	12.6	15.7
Silver maple	183.7	113.9	71.0	21.1	21.8	69.8	36.3	33.5
Sycamore	2.2	1.7	1.4	.3	(4/)	.5	--	.5
Hackberry	13.6	9.9	4.4	1.5	4.0	3.7	2.2	1.5
Willow	90.0	61.9	22.6	8.2	31.1	28.1	18.4	9.7
Other soft hardwoods	60.7	25.6	12.8	4.9	7.9	35.1	24.6	10.5
White oak	167.6	132.5	76.1	24.9	31.5	35.1	11.5	23.6
Other white oaks	177.6	112.2	60.0	23.3	28.9	65.4	37.4	28.0
Northern red oak	166.0	126.8	84.3	24.5	18.0	39.2	13.6	25.6
Other red oaks	98.4	65.6	36.9	12.0	16.7	32.8	19.5	13.3
Hickory	78.3	63.6	24.1	7.7	31.8	14.7	9.5	5.2
White ash	60.1	45.5	25.3	8.6	11.6	14.6	5.4	9.2
Sugar maple	38.8	24.9	15.1	5.0	4.8	13.9	6.9	7.0
Black walnut	70.7	52.8	31.6	9.7	11.5	17.9	9.5	8.4
Other hard hardwoods	29.2	16.7	8.1	2.5	6.1	12.5	8.2	4.3
Noncommercial	2.5	--	--	--	--	2.5	2.5	--
All species	1,986.5	1,382.0	797.1	257.0	327.9	604.5	284.9	319.6

1/ Central stem between sawlog merchantable top and a point with a minimum diameter of 4 inches inside bark.

2/ Sound bole volume only.

3/ Limbs of both merchantable and cull hardwood trees of sawtimber size, to a minimum diameter of 4.0 inches inside bark.

4/ Less than 0.05 million cubic feet.

IOWA - STATE

Table 15.--Cubic volume of growing stock on commercial forest
area by species and stand-size class, 1954
(In million cubic feet)

Species	Total	Large : sawtimber: stands	Small : sawtimber: stands	Pole- : timber: stands	Seedling & sapling stands ^{1/}	
	Percent					
Eastern redcedar	3.8	0.3	(2/)	0.3	2.3	1.2
Black ash	11.4	.8	9.2	1.5	.4	.3
American elm	206.6	15.0	113.7	27.8	44.2	20.9
Slippery elm	88.2	6.4	52.9	13.2	18.2	3.9
Aspen	15.0	1.1	1.7	9.0	4.3	--
Cottonwood	120.4	8.7	100.6	13.7	3.9	2.2
Basswood	83.0	6.0	58.9	10.2	8.7	5.2
Silver maple	113.9	8.2	82.8	23.3	7.1	.7
Sycamore	1.7	.1	1.7	--	--	--
Hackberry	9.9	.7	6.3	1.2	2.2	.2
Willow	61.9	4.5	12.0	10.4	31.9	7.6
Other soft hardwoods	25.6	1.9	11.3	6.2	5.2	2.9
White oak	132.5	9.6	55.0	36.0	31.0	10.5
Other white oaks	112.2	8.1	48.9	21.6	31.3	10.4
Northern red oak	126.8	9.2	78.0	30.3	16.6	1.9
Other red oaks	65.6	4.7	23.2	18.9	17.2	6.3
Hickory	63.6	4.6	17.5	15.2	25.1	5.8
White ash	45.5	3.3	28.7	8.4	3.4	5.0
Sugar maple	24.9	1.8	19.1	4.2	.9	.7
Black walnut	52.8	3.8	23.6	15.4	11.1	2.7
Other hard hardwoods	16.7	1.2	9.0	.5	6.1	1.1
All species	1,382.0	100.0	754.1	267.3	271.1	89.5
Percent	100.0	--	54.6	19.3	19.6	6.5

^{1/} Includes the volume on nonstocked and other areas.

^{2/} Less than 0.05 million cubic feet.

IOWA - STATE

Table 16.--Cubic volume of growing stock on commercial forest area
by tree-diameter class and stand-size class, 1954
(In million cubic feet)

Tree-diameter:		Stand-size class				
class	:	Large	: Small	: Poletimber	: Seedling	: All classes
(inches)	:	sawtimber	: sawtimber	:	& sapling ^{1/}	:
						<u>Percent</u>
6		9.2	5.3	38.8	4.0	57.3 4.1
8		20.2	19.2	54.6	5.1	99.1 7.2
10		51.0	49.0	66.4	5.4	171.8 12.4
12		58.8	65.0	33.5	9.7	167.0 12.1
14		65.6	65.4	29.5	16.0	176.5 12.8
16		104.7	29.1	16.1	14.3	164.2 11.9
18		103.9	19.3	11.6	6.8	141.6 10.2
20+		340.7	15.0	20.6	28.2	404.5 29.3
All classes		754.1	267.3	271.1	89.5	1,382.0 100.0

^{1/} Includes volume on nonstocked and other areas.

IOWA - STATE

Table 17.--Average volume per acre by stand-size class, 1954

Stand-size class	Average volume per acre	
	<u>Board-feet</u>	<u>Cubic feet</u> ^{1/}
Large sawtimber stands	4,541	1,021.8
Small sawtimber stands	3,377	997.4
Poletimber stands	600	326.6
Seedling and sapling stands ^{2/}	445	117.9
All stand-sizes	1,962	532.6
^{1/} Growing stock only.		
^{2/} Includes volume on nonstocked and other areas.		

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Table 18.--Forest and nonforest area by county, 1954

County	Total land area ^{1/}	Forest area	Nonforest area		
	Thousand acres	Thousand acres	Percent	Thousand acres	Percent
Allamakee	409	132	32	277	68
Benton	460	20	4	440	96
Buchanan	364	17	5	347	95
Cedar	374	23	6	351	94
Clayton	498	120	24	378	76
Clinton	445	30	7	415	93
Delaware	367	27	7	340	93
Dubuque	389	56	14	333	86
Fayette	466	38	8	428	92
Iowa	374	30	8	344	92
Jackson	412	82	20	330	80
Johnson	397	41	10	356	90
Jones	374	42	11	332	89
Linn	456	46	10	410	90
Muscatine	281	30	11	251	89
Poweshiek	377	17	5	360	95
Scott	290	15	5	275	95
Tama	461	30	7	431	93
Winneshiek	440	56	13	384	87
All counties	7,634	852	11	6,782	89

^{1/} Source: Area of the United States, 1950. U. S. Bureau of the Census. Does not include areas listed as inland water.

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Table 19.--Commercial forest area by ownership class, 1954

Ownership class	:	:	:	Commercial forest area ^{1/}
			<u>Thousand acres</u>	<u>Percent</u>
Federal:				
National forest			--	--
Indian			1	0.1
Other			8	1.0
Total federal			9	1.1
State			7	.8
County and Municipal			1	.1
Private:				
Farm			764	90.3
Industrial and other			65	7.7
Total private			829	98.0
All ownerships			846	100.0

^{1/} Does not include 1,000 acres of forest land in federal ownership and 5,000 acres in State ownership which are reserved from commercial timber use.

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Table 20.--Commercial forest area by forest type and
stand-size class, 1954
(In thousands of acres)

Forest type	:	Total	:	Large	:	Small	:	Pole-	:	Seedling
	:		:	sawtimber:	:	sawtimber:	:	timber:	:	& sapling
	:		:	stands	:	stands	:	stands	:	stands ^{1/}
<u>Percent</u>										
Elm-ash-cottonwood		346	40.9	168		22		83		73
Oak-hickory		364	43.0	105		87		121		51
Bur oak		36	4.3	2		2		15		17
Maple-birch		66	7.8	34		17		10		5
Hardwood-redcedar		19	2.2	--		--		9		10
Aspen-birch		15	1.8	--		5		10		--
All types		846	100.0	309		133		248		156
Percent		100.0		36.5		15.8		29.3		18.4

^{1/} Includes nonstocked and other areas.

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Table 21.--Sawtimber volume on commercial forest area by species
and stand-size class, 1954
(In million board-feet)

Species	:	Total	:	Large : sawtimber: stands	Small : sawtimber: stands	Pole-: timber: stands	Seedling & sapling stands ^{1/}
		Percent					
Eastern redcedar	3	0.1	--	1	--	2	
Black ash	28	1.3	23	4	1	--	
American elm	252	11.8	172	44	29	7	
Slippery elm	144	6.7	122	18	3	1	
Aspen	15	.7	1	14	--	--	
Cottonwood	166	7.8	156	4	6	--	
Basswood	181	8.5	129	31	20	1	
Silver maple	145	6.8	134	2	9	--	
Sycamore	9	.4	9	--	--	--	
Boxelder	11	.5	7	1	3	--	
Butternut	22	1.0	15	6	<u>2/</u>	1	
Black cherry	18	.8	8	5	3	2	
Hackberry	8	.4	6	2	--	--	
Willow	42	2.0	13	--	7	22	
Other soft hardwoods	1	.1	--	--	1	--	
White oak	219	10.2	105	76	32	6	
Bur oak	79	3.7	36	19	11	13	
Other white oaks	11	.5	11	--	--	--	
Black oak	75	3.5	23	48	4	--	
Northern red oak	290	13.6	192	73	17	8	
Other red oaks	96	4.5	60	19	11	6	
Hickory	79	3.7	21	26	19	13	
White ash	68	3.2	55	3	2	8	
Sugar maple	71	3.3	64	7	<u>2/</u>	--	
River birch	16	.7	14	--	2	--	
Black walnut	86	4.0	36	35	12	3	
Other hard hardwoods	5	.2	--	--	5	--	
All species	2,140	100.0	1,412	438	197	93	
Percent	100.0		66.0	20.5	9.2	4.3	

^{1/} Includes the volume on nonstocked and other areas.

^{2/} Less than 0.5 million board-feet.

Table 22.--Sawtimber volume on commercial forest area by species and tree-diameter class, 1954
(In million board-feet)

Species	Total	Tree-diameter class (inches)						
		12-14	16-18	20-22	24-26	28-30	32+	
Eastern redcedar	3	1/3	--	--	--	--	--	--
Black ash	28	7	14	7	--	--	--	--
American elm	252	69	82	50	26	--	25	--
Slippery elm	144	40	42	32	12	18	--	--
Aspen	15	11	4	--	--	--	--	--
Cottonwood	166	7	26	16	33	54	30	--
Basswood	181	62	64	40	5	--	10	--
Silver maple	145	13	40	26	31	10	25	--
Sycamore	9	--	--	--	--	9	--	--
Boxelder	11	7	4	--	--	--	--	--
Butternut	22	10	10	2	--	--	--	--
Black cherry	18	14	4	--	--	--	--	--
Hackberry	8	6	2	--	--	--	--	--
Willow	42	24	10	--	8	--	--	--
Other soft hardwoods	1	1	--	--	--	--	--	--
White oak	219	102	77	25	11	4	--	--
Bur oak	79	33	21	18	5	2	--	--
Other white oaks	11	2	2	--	--	7	--	--
Black oak	75	31	30	14	--	--	--	--
Northern red oak	290	87	97	74	21	11	--	--
Other red oaks	96	40	27	19	2	--	8	--
Hickory	79	54	25	--	--	--	--	--
White ash	68	21	15	5	--	27	--	--
Sugar maple	71	28	15	12	6	10	--	--
River birch	16	1	5	2	8	--	--	--
Black walnut	86	44	28	9	5	--	--	--
Other hard hardwoods	5	--	5	--	--	--	--	--
All species	2,140	1,717	649	351	173	152	98	
Percent	100.0	33.5	30.3	16.4	8.1	7.1	4.6	

1/ Includes 10-inch softwood sawtimber.

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Table 23.--Hardwood sawtimber volume by species group and log grade, 1954

Species group	Total volume	Log grade 1		Log grade 2		Log grade 3		Tie and timber grade	
		Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent
American elm	396	40	10	67	17	176	44	113	29
Cottonwood	166	32	19	15	9	63	38	56	34
Silver maple	145	21	15	22	15	74	51	28	19
White oaks ^{1/}	230	8	4	53	23	60	26	109	47
Bur oak	79	--	--	13	16	18	23	48	61
Red oaks	461	3	1	42	9	184	40	232	50
Hickory	79	--	--	4	5	40	51	35	44
Black walnut	86	8	9	29	34	41	48	8	9
Other hardwoods	495	69	14	94	19	193	39	139	28
All hardwoods	2,137	181	8	339	16	849	40	768	36

^{1/} Includes all white oaks except bur oak.

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Table 24.--Total cubic volume of sound material on commercial forest
area by species and class of material, 1954
(In million cubic feet)

Species	: Total : sound : material	: Growing stock				: Other material		
		: Sawtimber trees		: Pole-		: Cull		: Hardwood
		: Total	: Sawlog	: Upper	: tim-	: Total	: trees	
		: portion	: stem ^{1/}	: ber		: 2/	: 3/	limbs
Eastern redcedar	2.1	2.1	0.5	0.1	1.5	--	--	--
Black ash	9.1	7.9	4.5	1.0	2.4	1.2	0.4	0.8
American elm	101.3	70.1	39.3	14.7	16.1	31.2	10.6	20.6
Slippery elm	44.3	34.8	22.2	6.6	6.0	9.5	2.7	6.8
Aspen	17.0	14.8	2.7	.6	11.5	2.2	1.7	.5
Cottonwood	42.3	32.0	25.4	6.2	.4	10.3	1.5	8.8
Basswood	58.2	46.5	29.3	7.7	9.5	11.7	4.7	7.0
Silver maple	53.5	33.4	21.9	6.0	5.5	20.1	9.0	11.1
Sycamore	2.2	1.7	1.4	.3	(4/)	.5	--	.5
Hackberry	3.1	2.2	1.3	.5	.4	.9	.6	.3
Willow	20.2	11.7	7.2	3.1	1.4	8.5	4.7	3.8
Other soft hardwoods	28.7	16.5	8.6	3.0	4.9	12.2	7.9	4.3
White oak	71.7	57.2	33.5	10.7	13.0	14.5	4.9	9.6
Other white oaks	42.8	27.7	14.0	5.6	8.1	15.1	7.6	7.5
Northern red oak	90.1	69.2	46.3	12.7	10.2	20.9	7.1	13.8
Other red oaks	58.1	42.2	27.7	8.5	6.0	15.9	7.9	8.0
Hickory	31.6	27.9	12.4	3.8	11.7	3.7	1.3	2.4
White ash	23.1	18.2	10.8	3.1	4.3	4.9	1.5	3.4
Sugar maple	29.5	18.2	11.0	3.6	3.6	11.3	5.9	5.4
Black walnut	30.6	22.9	14.1	4.4	4.4	7.7	4.1	3.6
Other hard hardwoods	10.2	7.2	3.3	.9	3.0	3.0	1.4	1.6
Noncommercial	.5	--	--	--	--	.5	.5	--
All species	770.2	564.4	337.4	103.1	123.9	205.8	86.0	119.8

1/ Central stem between sawlog merchantable top and a point with a minimum diameter of 4 inches inside bark.

2/ Sound bole volume only.

3/ Limbs of both merchantable and cull hardwood trees of sawtimber size, to a minimum diameter of 4.0 inches inside bark.

4/ Less than 0.05 million cubic feet.

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Table 25.--Cubic volume of growing stock on commercial forest
area by species and stand-size class, 1954
(In million cubic feet)

Species	:	Total	:	Large : sawtimber: stands	Small : sawtimber: stands	Pole- : timber: stands	Seedling & sapling stands ^{1/}
	:		:				
	:	Percent	:				
Eastern redcedar	:	2.1	:	0.4	(2/)	0.1	1.0
Black ash	:	7.9	:	1.4	6.0	1.5	.4
American elm	:	70.1	:	12.4	42.0	14.3	12.0
Slippery elm	:	34.8	:	6.2	25.8	5.4	3.1
Aspen	:	14.8	:	2.6	1.7	9.0	4.1
Cottonwood	:	32.0	:	5.7	29.6	.8	1.2
Basswood	:	46.5	:	8.2	31.0	8.9	6.4
Silver maple	:	33.4	:	5.9	29.8	.7	2.9
Sycamore	:	1.7	:	.3	1.7	--	--
Hackberry	:	2.2	:	.4	1.9	.3	--
Willow	:	11.7	:	2.1	3.5	--	3.0
Other soft hardwoods	:	16.5	:	2.9	7.9	4.3	3.2
White oak	:	57.2	:	10.1	24.0	20.9	10.7
Other white oaks	:	27.7	:	4.9	11.5	5.0	7.5
Northern red oak	:	69.2	:	12.3	39.0	22.1	6.3
Other red oaks	:	42.2	:	7.5	18.4	15.8	6.7
Hickory	:	27.9	:	4.9	6.4	7.6	10.3
White ash	:	18.2	:	3.2	13.7	1.8	1.1
Sugar maple	:	18.2	:	3.2	13.8	3.6	.8
Black walnut	:	22.9	:	4.1	8.6	9.3	4.3
Other hard hardwoods	:	7.2	:	1.3	3.2	.2	3.7
All species	:	564.4	:	100.0	319.5	131.6	88.7
Percent	:	100.0	:	--	56.6	23.3	15.7

^{1/} Includes the volume on nonstocked and other areas.

^{2/} Less than 0.05 million cubic feet.

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Table 26.--Cubic volume of growing stock on commercial forest area
by tree-diameter class and stand-size class, 1954
(In million cubic feet)

Tree-diameter:		Stand-size class				
class	:	Large	:	Small	:	Poletimber: Seedling : All classes
(inches)	:	sawtimber:	:	sawtimber:	:	& sapling ^{1/} :
						Percent
6		4.8		3.3		9.2 0.8 18.1 3.2
8		10.2		10.4		15.3 1.9 37.8 6.7
10		21.8		24.8		20.2 1.4 68.2 12.1
12		27.9		31.1		13.1 3.0 75.1 13.3
14		33.6		29.8		13.3 6.5 83.2 14.7
16		47.8		15.6		5.9 3.4 72.7 12.9
18		42.5		8.8		6.1 .8 58.2 10.3
20+		130.9		7.8		5.6 6.8 151.1 26.8
All classes		319.5		131.6		88.7 24.6 564.4 100.0

^{1/} Includes volume on nonstocked and other areas.

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Table 27.--Average volume per acre by stand-size class, 1954

Stand-size class	Average volume per acre	
	<u>Board-feet</u>	<u>Cubic feet</u> ^{1/}
Large sawtimber stands	4,570	1,034
Small sawtimber stands	3,293	990
Poletimber stands	794	358
Seedling and sapling stands ^{2/}	596	158
All stand-sizes	2,530	667

^{1/} Growing stock only.

^{2/} Includes volume on nonstocked and other areas.

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Table 28.--Forest and nonforest area by county, 1954

County	Total land area ^{1/}	Forest area	Nonforest area		
	Thousand acres	Thousand acres	Percent	Thousand acres	Percent
Appanoose	335	56	17	279	83
Boone	367	30	8	337	92
Clarke	275	39	14	236	86
Dallas	382	36	9	346	91
Davis	326	51	16	275	84
Decatur	339	57	17	282	83
Des Moines	262	40	15	222	85
Guthrie	381	38	10	343	90
Henry	282	36	13	246	87
Jefferson	279	37	13	242	87
Keokuk	371	36	9	336	91
Lee	334	81	24	253	76
Louisa	258	41	16	217	84
Lucas	278	51	18	227	82
Madison	362	50	14	312	86
Mahaska	366	31	8	335	92
Marion	363	52	14	311	86
Monroe	278	71	26	207	74
Polk	380	32	8	348	92
Ringgold	344	27	8	317	92
Van Buren	312	64	21	248	79
Wapello	280	49	18	231	82
Warren	366	44	12	322	88
Washington	363	37	10	326	90
Wayne	340	27	8	313	92
Webster	459	26	6	433	94
All counties	8,682	1,138	13	7,544	87

^{1/} Source: Area of the United States, 1950. U. S. Bureau of the Census. Does not include areas listed as inland water.

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Table 29.--Commercial forest area by ownership class, 1954

Ownership class	Commercial forest area ^{1/}	
	<u>Thousand acres</u>	<u>Percent</u>
Federal:		
National Forest	3	0.3
Indian	--	--
Other	1	.1
Total federal	4	.4
State	13	1.1
County and Municipal	(2/)	(2/)
Private:		
Farm	965	85.6
Industrial and other	145	12.9
Total private	1,110	98.5
All ownerships	1,127	100.0

^{1/} Does not include 10,000 acres of forest land in State ownership and 1,000 acres in county and municipal ownership which are reserved from commercial timber use.

^{2/} Less than 0.5 thousand acres and/or 0.05 percent.

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Table 31.--Sawtimber volume on commercial forest area by species
and stand-size class, 1954
(In million board-feet)

Species	Total	Percent	Large : sawtimber: : stands	Small : sawtimber: : stands	Pole-: timber: stands	Seedling & sapling stands ^{1/}
Eastern redcedar	3	0.2	--	--	2	1
American elm	285	17.5	143	32	51	59
Slippery elm	92	5.7	37	31	18	6
Cottonwood	116	7.1	84	20	12	--
Basswood	83	5.1	55	2	5	21
Silver maple	174	10.7	100	71	3	--
Boxelder	3	.2	1	1	1	--
Butternut	1	.1	--	--	1	--
Black cherry	3	.2	--	--	1	2
Hackberry	5	.3	2	2	1	--
Willow	63	3.9	16	31	13	3
Other soft hardwoods	6	.4	4	2	--	--
White oak	247	15.2	117	65	31	34
Bur oak	126	7.8	69	20	20	17
Other white oaks	9	.6	3	5	1	--
Black oak	21	1.3	10	1	2	8
Northern red oak	185	11.4	136	35	14	--
Other red oaks	22	1.3	11	--	6	5
Hickory	46	2.8	21	13	11	1
White ash	33	2.0	22	8	--	3
Sugar maple	13	.8	12	--	1	--
River birch	14	.9	12	1	1	--
Black walnut	67	4.1	38	26	2	1
Other hard hardwoods	7	.4	2	--	4	1
All species	1,624	100.0	895	366	201	162
Percent	100.0		55.1	22.5	12.4	10.0

^{1/} Includes the volume on nonstocked and other areas.

^{2/} Less than 0.5 million board-feet.

Table 32.--Sawtimber volume on commercial forest area by species and tree-diameter class, 1954
(In million board-feet)

Species	Total	Tree-diameter class (inches)						32+
		12-14	16-18	20-22	24-26	28-30		
Eastern redcedar	3	1/3	--	--	--	--	--	
American elm	285	68	87	65	30	22	13	
Slippery elm	92	36	31	16	2	7	--	
Cottonwood	116	15	28	19	12	12	30	
Basswood	83	20	37	16	10	--	--	
Silver maple	174	60	36	34	30	14	--	
Boxelder	3	3	--	--	--	--	--	
Butternut	1	1	--	--	--	--	--	
Black cherry	3	3	--	--	--	--	--	
Hackberry	5	3	2	--	--	--	--	
Willow	63	32	22	5	4	--	--	
Other soft hardwoods	6	4	2	--	--	--	--	
White oak	247	87	85	35	13	20	7	
Bur oak	126	50	25	20	9	17	5	
Other white oaks	9	4	3	2	--	--	--	
Black oak	21	2	3	4	--	12	--	
Northern red oak	185	50	55	28	33	5	14	
Other red oaks	22	3	2	3	14	--	--	
Hickory	46	33	9	4	--	--	--	
White ash	33	8	13	4	2	6	--	
Sugar maple	13	3	4	6	--	--	--	
River birch	14	4	4	3	3	--	--	
Black walnut	67	32	29	6	--	--	--	
Other hard hardwoods	7	2	5	--	--	--	--	
All species	1,624	1/526	482	270	162	115	69	
Percent	100.0	32.4	29.7	16.6	10.0	7.1	4.2	
1/ Includes 10-inch softwood sawtimber.								

1/ Includes 10-inch softwood sawtimber.

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Table 33.--Hardwood sawtimber volume by species group and log grade, 1954

Species group	Total volume	Log grade 1			Log grade 2			Log grade 3			Tie and timber grade	
		Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent	
American elm	377	57	15	55	15	143	38	122	32			
Cottonwood	116	47	41	19	16	10	9	40	34			
Silver maple	174	8	5	13	7	51	29	102	59			
White oaks ^{1/}	256	12	5	63	24	77	30	104	41			
Bur oak	126	--	--	30	24	21	17	75	59			
Red oaks	228	15	6	36	16	88	39	89	39			
Hickory	46	--	--	3	7	19	41	24	52			
Black walnut	67	9	13	12	18	45	67	1	2			
Other hardwoods	231	24	10	71	31	44	19	92	40			
All hardwoods	1,621	172	10	302	19	498	31	649	40			

^{1/} Includes all white oaks except bur oak.

SOUTHEASTERN IOWA

Table 34.--Total cubic volume of sound material on commercial forest
area by species and class of material, 1954
(In million cubic feet)

Species	: Total : sound : material	: Growing stock				: Other material		
		: Sawtimber trees:				: Cull : Hardwood		
		: Total: Sawlog : Upper : tim-				: Total: trees: limbs		
		: portion : stem ¹ /: ber :				: ² / ₃ :		
Eastern redcedar	1.4	1.4	0.5	0.1	0.8	--	--	--
American elm	134.7	83.5	44.1	18.2	21.2	51.2	21.5	29.7
Slippery elm	48.5	30.6	14.3	5.2	11.1	17.9	9.0	8.9
Aspen	.2	.2	--	--	.2	--	--	--
Cottonwood	28.2	22.8	18.0	4.2	.6	5.4	.5	4.9
Basswood	28.1	18.6	13.3	4.3	1.0	9.5	4.4	5.1
Silver maple	68.6	48.5	27.3	7.9	13.3	20.1	10.8	9.3
Hackberry	4.6	3.4	.7	.3	2.4	1.2	1.0	.2
Willow	46.6	34.9	11.0	3.5	20.4	11.7	8.2	3.5
Other soft hardwoods	10.0	5.0	1.8	.7	2.5	5.0	3.7	1.3
White oak	81.2	63.8	36.9	12.5	14.4	17.4	5.0	12.4
Other white oaks	58.0	37.3	21.3	8.1	7.9	20.7	9.9	10.8
Northern red oak	54.0	41.3	29.1	8.6	3.6	12.7	4.1	8.6
Other red oaks	31.1	17.5	6.5	2.5	8.5	13.6	9.4	4.2
Hickory	32.7	24.6	7.1	2.3	15.2	8.1	6.5	1.6
White ash	13.9	9.7	5.2	2.1	2.4	4.2	1.8	2.4
Sugar maple	5.1	3.7	2.0	.7	1.0	1.4	.7	.7
Black walnut	25.4	19.5	11.2	3.2	5.1	5.9	3.1	2.8
Other hard hardwoods	15.3	7.0	3.6	1.2	2.2	8.3	5.9	2.4
Noncommercial	.6	--	--	--	--	.6	.6	--
All species	688.2	473.3	253.9	85.6	133.8	214.9	106.1	108.8

¹/ Central stem between sawlog merchantable top and a point with a minimum diameter of 4 inches inside bark.

²/ Sound bole volume only.

³/ Limbs of both merchantable and cull hardwood trees of sawtimber size, to a minimum diameter of 4.0 inches inside bark.

SOUTHEASTERN IOWA

Table 35.--Cubic volume of growing stock on commercial forest
area by species and stand-size class, 1954
(In million cubic feet)

Species	:	Total	:	Large	:	Small	:	Pole-	:	Seedling
	:		:	sawtimber:	:	sawtimber:	:	timber:	:	& sapling
	:		:	stands	:	stands	:	stands:	:	stands ^{1/}
<u>Percent</u>										
Eastern redcedar		1.4	0.3	--		--		1.3		0.1
American elm		83.5	17.6	34.8		8.2		25.7		14.8
Slippery elm		30.6	6.5	9.9		7.2		11.3		2.2
Aspen		.2	(2/)	--		--		.2		--
Cottonwood		22.8	4.8	15.7		4.3		2.5		.3
Basswood		18.6	3.9	12.0		.5		1.5		4.6
Silver maple		48.5	10.3	22.8		22.5		3.1		.1
Hackberry		3.4	.7	1.0		.9		1.3		.2
Willow		34.9	7.4	6.7		10.4		16.3		1.5
Other soft hardwoods		5.0	1.1	1.0		1.7		1.5		.8
White oak		63.8	13.5	24.9		15.1		15.7		8.1
Other white oaks		37.3	7.9	15.4		7.0		10.8		4.1
Northern red oak		41.3	8.7	28.3		8.1		4.8		.1
Other red oaks		17.5	3.7	4.4		.2		9.5		3.4
Hickory		24.6	5.2	7.9		3.8		11.0		1.9
White ash		9.7	2.0	6.2		1.8		.9		.8
Sugar maple		3.7	.8	3.4		.2		.1		--
Black walnut		19.5	4.1	9.6		6.1		3.3		.5
Other hard hardwoods		7.0	1.5	3.5		.3		2.4		.8
All species		473.3	100.0	207.5		98.3		123.2		44.3
Percent		100.0	--	43.8		20.8		26.0		9.4

^{1/} Includes the volume on nonstocked and other areas.

^{2/} Less than 0.05 percent.

SOUTHEASTERN IOWA

Table 36.--Cubic volume of growing stock on commercial forest area
by tree-diameter class and stand-size class, 1954
(In million cubic feet)

Tree-diameter:		Stand-size class				
class	:	Large	:	Small	:	Poletimber: Seedling
(inches)	:	sawtimber:	:	sawtimber:	:	& sapling ^{1/} :
						Percent
6		2.6		1.4		21.2
8		5.9		5.9		28.3
10		18.2		12.6		29.5
12		17.1		24.6		11.8
14		17.5		27.5		8.1
16		29.9		10.0		7.0
18		27.2		9.6		4.3
20+		89.1		6.7		13.0
						2.5
						2.2
						3.6
						4.0
						6.8
						5.5
						5.1
						14.6
						27.7
						42.3
						63.9
						57.5
						59.9
						52.4
						46.2
						123.4
						26.1
All classes		207.5		98.3		123.2
						44.3
						473.3
						100.0

^{1/} Includes volume on nonstocked and other areas.

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Table 37.--Average volume per acre by stand-size class, 1954

Stand-size class	Average volume per acre	
	<u>Board-feet</u>	<u>Cubic feet</u> ^{1/}
Large sawtimber stands	3,996	926.3
Small sawtimber stands	3,697	992.9
Poletimber stands	508	311.1
Seedling and sapling stands ^{2/}	397	108.6
All stand-sizes	1,441	420.0

^{1/} Growing stock only.

^{2/} Includes the volume on nonstocked and other areas.

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Table 38.--Forest and nonforest area by county, 1954

County	Total land area ^{1/}	Forest area	Nonforest area
	<u>Thousand acres</u>	<u>Thousand acres</u> <u>Percent</u>	<u>Thousand acres</u> <u>Percent</u>
Adair	364	12 3	352 97
Adams	273	16 6	257 94
Audubon	287	4 1	283 99
Black Hawk	363	17 5	346 95
Bremer	281	15 5	266 95
Buena Vista	367	5 1	362 99
Butler	373	15 4	358 96
Calhoun	366	2 1	364 99
Carroll	367	5 1	362 99
Cass	358	9 3	349 97
Cerro Gordo	369	4 1	365 99
Cherokee	367	11 3	356 97
Chickasaw	323	16 5	307 95
Clay	365	8 2	357 98
Crawford	458	14 3	444 97
Dickinson	244	4 2	240 98
Emmet	253	4 2	249 98
Floyd	322	9 3	313 97
Franklin	375	4 1	371 99
Fremont	335	31 9	304 91
Greene	364	12 3	352 97
Grundy	321	1 (2/)	320 100
Hamilton	369	9 2	360 98
Hancock	365	3 1	362 99
Hardin	367	14 4	353 96
Harrison	445	44 10	401 90
Howard	301	11 4	290 96
Humboldt	278	6 2	272 98
Ida	276	2 1	274 99
Jasper	471	31 7	440 93
Kossuth	627	8 1	619 99
Lyon	376	4 1	372 99

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Table 38.--Forest and nonforest area by county, 1954 (cont'd)

County	Total land area ^{1/}	Forest area	Nonforest area
	<u>Thousand acres</u>	<u>Thousand acres</u> <u>Percent</u>	<u>Thousand acres</u> <u>Percent</u>
Marshall	367	14 4	353 96
Mills	285	25 9	260 91
Mitchell	299	10 3	289 97
Monona	446	48 11	398 89
Montgomery	270	10 4	260 96
O'Brien	368	4 1	364 99
Osceola	255	2 8	253 92
Page	342	12 4	330 96
Palo Alto	359	6 2	353 98
Plymouth	552	12 2	540 98
Pocahontas	371	1 (2/)	370 100
Pottawattamie	617	27 4	590 96
Sac	370	6 2	364 98
Shelby	376	5 1	371 99
Sioux	490	3 1	487 99
Story	364	13 4	351 96
Taylor	338	21 6	317 94
Union	273	22 8	251 92
Winnebago	257	3 1	254 99
Woodbury	558	25 4	533 96
Worth	257	5 2	252 98
Wright	369	6 2	363 98
All counties	19,553	630 3	18,923 97

^{1/} Source: Area of the United States, 1950. U. S. Bureau of the Census. Does not include areas listed as inland water.

^{2/} Less than 0.5 percent.

WESTERN IOWA

Table 39.--Commercial forest area by ownership class, 1954

Ownership class	Commercial forest area ^{1/}	
	<u>Thousand acres</u>	<u>Percent</u>
Federal:		
National Forest	--	--
Indian	--	--
Other	--	--
Total federal	--	--
State	2	0.3
County and Municipal	1	0.2
Private:		
Farm	553	88.9
Industrial and other	66	10.6
Total private	619	99.5
All ownerships	622	100.0

^{1/} Does not include 8,000 acres of forest land in State ownership which are reserved from commercial timber use.

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Table 40.--Commercial forest area by forest type and
stand-size class, 1954
(In thousands of acres)

Forest type	:	Total	:	Large	:	Small	:	Pole-	:	Seedling
	:		:	sawtimber:	:	sawtimber:	:	timber:	:	& sapling
	:		:	stands	:	stands	:	stands	:	stands ^{1/}
<u>Percent</u>										
Elm-ash-cottonwood		370	59.5	156		23		83		108
Oak-hickory		105	16.9	23		2		45		35
Bur oak		129	20.7	21		9		58		41
Maple-birch		7	1.1	5		2		--		--
Hardwood-redcedar		6	1.0	--		--		--		6
Aspen-birch		5	.8	--		--		--		5
All types		622	100.0	205		36		186		195
Percent		100.0		33.0		5.8		29.9		31.3

^{1/} Includes the volume on nonstocked and other areas.

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Table 41.--Sawtimber volume on commercial forest area by species
and stand-size class, 1954
(In million board-feet)

Species	:	Total	:	Large : sawtimber: stands	Small : sawtimber: stands	Pole-: timber: stands	Seedling & sapling stands ^{1/}
<u>Percent</u>							
Black ash	11	0.8	11	--	--	--	--
American elm	205	15.4	154	16	19	16	16
Slippery elm	94	7.1	80	1	8	5	5
Cottonwood	319	24.0	287	24	1	7	7
Basswood	78	5.9	72	4	--	2	2
Silver maple	143	10.8	141	--	--	2	2
Boxelder	9	.7	3	1	1	4	4
Black cherry	2	.1	2	--	--	--	--
Hackberry	16	1.2	16	--	--	--	--
Willow	25	1.9	7	--	14	4	4
Other soft hardwoods	4	.3	4	--	--	--	--
White oak	38	2.9	31	--	3	4	4
Bur oak	155	11.7	91	26	28	10	10
Other white oaks	3	.2	2	1	--	--	--
Northern red oak	57	4.3	50	<u>2/</u>	7	--	--
Other red oaks	17	1.3	2	8	--	7	7
Hickory	30	2.3	10	9	9	2	2
White ash	60	4.5	39	10	--	11	11
Sugar maple	14	1.0	9	2	--	3	3
River birch	7	.5	7	--	--	--	--
Black walnut	40	3.0	26	--	9	5	5
Other hard hardwoods	1	.1	--	--	--	1	1
All species	1,328	100.0	1,044	102	99	83	83
Percent	100.0		78.6	7.7	7.4	6.3	6.3

^{1/} Includes the volume on nonstocked and other areas.

^{2/} Less than 0.5 million board-feet.

Table 42.--Sawtimber volume on commercial forest area by species and tree-diameter class, 1954
(In million board-feet)

Species	: Total	Tree-diameter class (inches)						
		: 12-14	: 16-18	: 20-22	: 24-26	: 28-30	: 32+	
Black ash	11	4	7	--	--	--	--	--
American elm	205	45	59	43	27	8	23	23
Slippery elm	94	27	40	13	--	14	--	--
Cottonwood	319	31	31	54	65	29	109	109
Basswood	78	17	34	20	--	7	--	--
Silver maple	143	13	48	82	--	--	--	--
Boxelder	9	5	2	--	2	--	--	--
Black cherry	2	--	2	--	--	--	--	--
Hackberry	16	(1/)	3	2	4	7	--	--
Willow	25	19	6	--	--	--	--	--
Other soft hardwoods	4	1	3	--	--	--	--	--
White oak	38	9	4	25	--	--	--	--
Bur oak	155	54	60	18	23	--	--	--
Other white oaks	3	1	2	--	--	--	--	--
Northern red oak	57	10	22	22	--	--	3	3
Other red oaks	17	8	2	--	7	--	--	--
Hickory	30	21	9	--	--	--	--	--
White ash	60	17	6	17	6	14	--	--
Sugar maple	14	4	7	--	3	--	--	--
River birch	7	1	4	2	--	--	--	--
Black walnut	40	9	19	8	4	--	--	--
Other hard hardwoods	1	1	--	--	--	--	--	--
All species	1,328	297	370	306	141	79	135	135
Percent	100.0	22.4	27.9	23.0	10.6	5.9	10.2	10.2
1/ Less than 0.5 million board-feet.								

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Table 43.--Hardwood sawtimber volume by species group and log grade, 1954

Species group	Total volume	Log grade 1			Log grade 2			Log grade 3			Tie and timber grade		
		Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent	Million board- feet	Percent
American elm	299	50	16	92	31	95	32	62	21				
Cottonwood	319	93	29	84	26	94	30	48	15				
Silver maple	143	15	10	39	27	31	22	58	41				
White oaks ^{1/}	41	7	17	--	--	22	54	12	29				
Bur oak	155	--	--	35	22	12	8	108	70				
Red oaks	74	7	9	8	11	17	23	42	57				
Hickory	30	--	--	1	3	16	54	13	43				
Black walnut	40	15	38	12	30	11	27	2	5				
Other hardwoods	227	44	19	69	31	80	35	34	15				
All hardwoods	1,328	231	17	340	26	378	28	379	29				

^{1/} Includes all white oaks except bur oak.

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Table 44.--Total cubic volume of sound material on commercial forest
area by species and class of material, 1954
(In million cubic feet)

Species	: Total : sound : material	: Growing stock				: Other material		
		: Sawtimber trees		: Pole-		: Cull		: Hardwood
		: Total	: Sawlog	: Upper	: tim-	: Total	: trees	: limbs
		: portion	: stem ^{1/}	: ber	:	: ^{2/}	:	: ^{3/}
Eastern redcedar	0.3	0.3	--	--	0.3	--	--	--
Black ash	4.0	3.5	1.9	0.4	1.2	0.5	0.2	0.3
American elm	85.9	53.0	31.7	12.5	8.8	32.9	13.0	19.9
Slippery elm	32.9	22.8	14.5	4.5	3.8	10.1	4.8	5.3
Cottonwood	83.6	65.6	48.8	12.9	3.9	18.0	.9	17.1
Basswood	25.0	17.9	12.4	3.6	1.9	7.1	3.5	3.6
Silver maple	61.6	32.0	21.8	7.2	3.0	29.6	16.5	13.1
Hackberry	5.9	4.3	2.4	.7	1.2	1.6	.6	1.0
Willow	23.2	15.3	4.4	1.6	9.3	7.9	5.5	2.4
Other soft hardwoods	22.0	4.1	2.4	1.2	.5	17.9	13.0	4.9
White oak	14.7	11.5	5.7	1.7	4.1	3.2	1.6	1.6
Other white oaks	76.8	47.2	24.7	9.6	12.9	29.6	19.9	9.7
Northern red oak	21.9	16.3	8.9	3.2	4.2	5.6	2.4	3.2
Other red oaks	9.2	5.9	2.7	1.0	2.2	3.3	2.2	1.1
Hickory	14.0	11.1	4.6	1.6	4.9	2.9	1.7	1.2
White ash	23.1	17.6	9.3	3.4	4.9	5.5	2.1	3.4
Sugar maple	4.2	3.0	2.1	.7	.2	1.2	.3	.9
Black walnut	14.7	10.4	6.3	2.1	2.0	4.3	2.3	2.0
Other hard hardwoods	3.7	2.5	1.2	.4	.9	1.2	.9	.3
Noncommercial	1.4	--	--	--	--	1.4	1.4	--
All species	528.1	344.3	205.8	68.3	70.2	183.8	92.8	91.0

^{1/} Central stem between sawlog merchantable top and a point with a minimum diameter of 4 inches inside bark.

^{2/} Sound bole volume only.

^{3/} Limbs of both merchantable and cull hardwood trees of sawtimber size, to a minimum diameter of 4.0 inches inside bark.

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Table 45.--Cubic volume of growing stock on commercial forest area by species and stand-size class, 1954

(In million cubic feet)

Species	Total	Large : sawtimber : stands	Small : sawtimber : stands	Pole- : timber : stands	Seedling & sapling stands ^{1/}	
Percent						
Eastern redcedar	0.3	0.1	--	0.2	--	0.1
Black ash	3.5	1.0	3.2	--	--	.3
American elm	53.0	15.4	36.9	5.3	6.5	4.3
Slippery elm	22.8	6.6	17.2	.6	3.8	1.2
Cottonwood	65.6	19.1	55.3	8.6	.2	1.5
Basswood	17.9	5.2	15.9	.8	.8	.4
Silver maple	32.0	9.3	30.2	.1	1.1	.6
Hackberry	4.3	1.3	3.4	--	.9	--
Willow	15.3	4.5	1.8	--	12.6	.9
Other soft hardwoods	4.1	1.2	2.4	.2	.5	1.0
White oak	11.5	3.3	6.1	--	4.6	.8
Other white oaks	47.2	13.7	22.0	9.6	13.0	2.6
Northern red oak	16.3	4.7	10.7	.1	5.5	--
Other red oaks	5.9	1.7	.4	2.9	1.0	1.6
Hickory	11.1	3.2	3.2	3.8	3.8	.3
White ash	17.6	5.1	8.8	4.8	1.4	2.6
Sugar maple	3.0	.9	1.9	.4	--	.7
Black walnut	10.4	3.0	5.4	--	3.5	1.5
Other hardwoods	2.5	.7	2.3	--	--	.2
All species	344.3	100.0	227.1	37.4	59.2	20.6
Percent	100.0	--	65.9	10.9	17.2	6.0

^{1/} Includes the volume on nonstocked and other areas.

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Table 46.--Cubic volume of growing stock on commercial forest area
by tree-diameter class and stand-size class, 1954
(In million cubic feet)

Tree-diameter:		Stand-size class				
class	:	Large	:	Small	:	Seedling
(inches)	:	sawtimber:	:	sawtimber:	:	& sapling ^{1/} :
						Percent
6		1.8		0.6		8.4
8		4.1		2.9		11.0
10		11.0		11.6		16.7
12		13.8		9.3		8.6
14		14.5		8.1		8.1
16		27.0		3.5		3.2
18		34.2		.9		1.2
20+		120.7		.5		2.0
All classes		227.1		37.4		59.2
						20.6
						344.3
						100.0

^{1/} Includes volume on nonstocked and other grades.

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Table 47.--Average volume per acre by stand-size class, 1954

Stand-size class	Average volume per acre	
	<u>Board-feet</u>	<u>Cubic feet</u> ^{1/}
Large sawtimber stands	5,093	1,107.8
Small sawtimber stands	2,806	1,038.9
Poletimber stands	538	318.3
Seedling and sapling stands ^{2/}	426	105.6
All stand-sizes	2,135	553.5

^{1/} Growing stock only.

^{2/} Includes the volume on nonstocked and other areas.

FOREST SURVEY METHODS

The inventory of the forest resources of Iowa involved an office study of aerial photographs and a field examination of randomly selected forest and nonforest plots.

The percentage of forest land in each county was obtained by placing a transparent template marked with uniformly spaced dots over aerial photographs and counting the number of dots falling on forest and nonforest areas. The percentage of forest dots in a county, multiplied by the total area gave a preliminary estimate of the forest area. This was later adjusted after field examination indicated the number of plots that had changed since the aerial photos were taken.

A selected number of forest dots were marked on the photographs. The acre surrounding each dot was examined under stereoscope and was classified by stand-size class on the basis of the height, crown width, and number of trees on the plot. Plots to be examined in the field were then randomly drawn. In drawing, greatest weight was given to the stand-size classes containing the largest timber volume. In addition, nonforest plots were selected for field examination to measure the conversion of open land to forest since the photographs were taken.

The selected field plots were marked on the photographs. Field crews located these points on the ground and established 1/5-acre circular plots for which species, size, quality, and growth of trees and other data were recorded.

The following tabulation gives the number of dots and plots examined for each region.

	<u>North- eastern Region</u>	<u>South- eastern Region</u>	<u>Western Region</u>
Number of photo dots counted for forest-area determination	58,446	66,074	146,704
Number of plots stereoscopically examined and classified by stand-size	1,068	1,407	784
Number of forest plots field examined	262	316	173

ACCURACY OF DATA

Statistical analysis of the commercial forest area and timber volume data shows the following sampling errors^{2/} for each region:

	<u>COMMERCIAL FOREST :</u>		<u>GROWING STOCK :</u>		<u>SAWTIMBER</u>	
	Area	: Sampling:	Volume	: Sampling:	Volume	: Sampling:
	: error	:	: error	:	: error	:
	<u>Thousand</u>		<u>Million</u>		<u>Million</u>	
	<u>acres</u>	<u>Percent</u>	<u>cu. ft.</u>	<u>Percent</u>	<u>bd.-ft.</u>	<u>Percent</u>
Northeastern	846	1.8	565	5.4	2,140	6.6
Southeastern	1,127	1.5	473	5.7	1,624	7.4
Western	622	3.1	344	8.4	1,328	11.5
State	2,595	1.1	1,382	3.6	5,092	4.7

The estimates of sampling error do not include errors resulting from mistakes in measurement or judgment. All phases of field and office work were closely supervised to keep such errors to a minimum.

Since the percentage error increases with each subdivision of the total, small acreages or volumes may have large errors and may therefore indicate only relative magnitudes. A rough guide for estimating the sampling errors of various acreages and volumes is given below:

	<u>COMMERCIAL FOREST :</u>		<u>GROWING STOCK :</u>		<u>SAWTIMBER</u>	
	Area	: Sampling:	Volume	: Sampling:	Volume	: Sampling:
	: error	:	: error	:	: error	:
	<u>Thousand</u>		<u>Million</u>		<u>Million</u>	
	<u>acres</u>	<u>Percent</u>	<u>cu. ft.</u>	<u>Percent</u>	<u>bd.-ft.</u>	<u>Percent</u>
	2,595	1	1,382	4	5,092	5
	1,000	2	500	6	1,000	11
	500	3	100	13	500	15
	100	6	50	19	100	34
	50	8	10	43	50	47
	10	18	1	135	10	106

^{2/} At one standard deviation; that is, the chances are two out of three that the calculated acreages and volumes do not differ from the totals that would have been obtained by 100 percent measurement by more than the errors shown in the tabulation.

EXPLANATION OF TERMS

Forest land.--Includes (a) land which is at least 10 percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting an influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking and which has not been developed for other use; (c) afforested areas.

The minimum area that qualifies as forest land is one acre. Strips of timber must be at least 120 feet wide to qualify. Conversely, clearings, streams, treeless strips and unimproved roads less than one acre in area or less than 120 feet in width within forest areas are classified as forest land. Improved rights-of-way such as graded roads, railroads, or transmission lines are classified as nonforest regardless of width.

Commercial forest land.--Forest land which is (a) producing, or physically capable of producing, usable crops of wood (usually sawtimber), (b) economically available now or prospectively, and (c) not withdrawn from timber utilization.

Noncommercial forest land.--Forest land withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land.

Forest types

Oak-hickory.--Forests in which 50 percent or more of the stand is upland oaks or hickory, singly or in combination; except where bur oak makes up 50 percent or more of the stand (in which case the stand is classified "bur oak"); and except where redcedar makes up 25 percent or more of the stand (in which case the stand is classified "hardwood-redcedar"). Common associates include elm, maple, and black walnut.

Bur oak.--Forests in which 50 percent or more of the stand is bur oak.

Hardwood-redcedar.--Forests in which 25 percent or more of the stand is redcedar and the remainder is hardwoods, usually oaks.

Maple-birch.--Forests in which 50 percent or more of the stand is hard maple or yellow birch, singly or in combination. Common associates include elm and basswood, and in the Northeastern Region white pine and hemlock.

Elm-ash-cottonwood.--Forests in which 50 percent or more of the stand is elm, ash, or cottonwood, singly or in combination. Common associates include willow, sycamore, and maple.

Aspen-birch.--Forests in which 50 percent or more of the stand is aspen, balsam poplar, or paper birch, singly or in combination.

Tree classes

Sawtimber tree.--A live softwood (coniferous) tree at least 9.0 inches d.b.h. or live hardwood tree of commercial species at least 11.0 inches d.b.h., with a sound butt log at least 8 feet long, or with at least half of the gross board-foot volume of the tree in sound material.

Poletimber tree.--A live, sound tree of commercial species at least 5.0 inches d.b.h. but less than sawtimber size that gives promise of becoming a sawtimber tree.

Seedling and sapling trees.--Live trees of commercial species less than 5.0 inches in diameter at breast height and of good form and vigor.

Cull tree.--A live tree at least 5.0 inches d.b.h. that does not qualify as a sawtimber or poletimber tree because of species, poor form, limbiness, rot, or other defect.

Volume estimates

Board-foot volume includes the sound volume of sawlogs in sawtimber trees to a minimum top d.i.b. of 6 inches for softwoods and 8 inches for hardwoods. Volume deductions have been made for rot, crook, and other defects. Board-foot volumes are shown in terms of the International 1/4-inch log rule, which measures the approximate yield of green lumber cut to standard specifications.

Cubic-foot volume

Total volume includes the sound wood inside bark in both sound and cull living trees 5.0 inches d.b.h. and larger, from the stump to a minimum top diameter of 4.0 inches inside bark. It includes the upper stems of softwood trees and the upper stems and limbs of hardwoods.

Growing stock includes the volume of sound wood inside bark in the stem portion of sawtimber and poletimber trees from stump to a minimum top d.i.b. of 4 inches.

Stand-size classes

Large sawtimber.--Stands having a net volume of 1,500 or more board-feet per acre in sawtimber trees, and having more than half of this volume in trees 15.0 inches d.b.h. and larger.

Small sawtimber.--Stands having a net volume of 1,500 or more board-feet per acre in sawtimber trees, and having at least half of this volume in trees smaller than 15.0 inches d.b.h.

Poletimber.--Stands failing to meet the sawtimber stand specifications, but at least 10 percent stocked with pole-timber and larger trees and with at least half the minimum stocking in poletimber trees.

Seedlings and saplings.--Stands not qualifying as either sawtimber or poletimber stands but having at least 150 seedlings and saplings of commercial species per acre.

Nonstocked.--Commercial forest land not qualifying for any other class.

Hardwood log grades

Grade 1.--Butt logs at least 13.0 inches (uppers at least 16 inches) in diameter inside bark with five-sixths of the surface on the three best faces clear of defect in not more than two cuttings, (minimum length of cutting variable, 3-7 feet, depending upon log diameter and position in tree). Minimum log length 10 feet. On the average such logs will yield at least 65 percent No. 1 common and better lumber.

Grade 2.--Logs at least 11 inches in diameter inside bark with two-thirds of the surface on the three best faces clear of defect in not more than three cuttings, (minimum length of cutting, 3 feet). Minimum log length 8 feet. On the average such logs will yield at least 40 percent No. 1 common and better lumber.

Grade 3.--Merchantable logs at least 8.0 inches in diameter inside bark at the small end, 8 feet long with one-half of the surface on the three best faces clear of defect in cuttings 2 feet long. Maximum cull deduction 50 percent. On the average such logs will yield less than 25 percent No. 1 common and better lumber.

Tie and timber.--This class includes the roughest logs considered merchantable. Tie and timber logs must be at least 8 inches in diameter inside bark at the small end and at least 8 feet long. No limit is placed on surface defects as long as they do not extend into the interior enough to affect the strength of the contained tie and timber.

PRINCIPAL TREE SPECIES^{3/}

Softwoods

Eastern redcedar^{4/}

- Juniperus virginiana

Hardwoods

Soft hardwoods:

Black ash

- Fraxinus nigra

American elm

- Ulmus americana

Slippery elm

- Ulmus rubra

"Aspen" includes:

Quaking aspen

- Populus tremuloides

Bigtooth aspen

- P. grandidentata

Balsam poplar

- P. balsamifera

Eastern cottonwood

- P. deltoides

American basswood

- Tilia americana

Silver maple

- Acer saccharinum

American sycamore

- Platanus occidentalis

Boxelder^{5/}

- Acer negundo

Butternut^{5/}

- Juglans cinerea

Black cherry^{5/}

- Prunus serotina

Hackberry

- Celtis occidentalis

Willow

- Salix spp.

"Other soft hardwoods" includes paper birch, sassafrass, red maple, and minor commercial low-density species.

Hard hardwoods:

White oak

- Quercus alba

Bur oak^{6/}

- Q. macrocarpa

"Other white oaks" includes:

Chinkapin oak

- Q. muehlenbergii

Swamp white oak

- Q. bicolor

Post oak

- Q. stellata

^{3/} Source of nomenclature: Check List of the Native and Naturalized Trees of the United States, Agriculture Handbook No. 41, Forest Service, Washington, D. C., 1953.

^{4/} Other native softwoods, such as eastern white pine and eastern hemlock, are not sufficiently common to be commercially important.

^{5/} Combined with "other soft hardwoods" in cubic-foot tables.

^{6/} Combined with "other white oaks" in cubic-foot tables.

Black oak ^{7/}	- <u>Q. velutina</u>
Northern red oak	- <u>Q. rubra</u>
"Other red oaks" includes:	
Scarlet oak	- <u>Q. coccinea</u>
Pin oak	- <u>Q. palustris</u>
Shingle oak	- <u>Q. imbricaria</u>
Blackjack oak	- <u>Q. marilandica</u>
Hickory	- <u>Carya spp.</u>
White ash includes:	
White ash	- <u>Fraxinus americana</u>
Blue ash	- <u>F. quadrangulata</u>
Green ash	- <u>F. pennsylvanica</u>
Sugar maple includes:	
Sugar maple	- <u>Acer saccharum</u>
Black maple	- <u>A. nigrum</u>
River birch ^{8/}	- <u>Betula nigra</u>
Black walnut	- <u>Juglans nigra</u>

"Other hard hardwoods" includes yellow birch, rock elm, red mulberry, honeylocust and minor commercial high-density species.

"Noncommercial species" includes American hornbeam, eastern hophornbeam, serviceberry, pin cherry, and others.

^{7/} Combined with "other red oaks" in the cubic-foot tables.
^{8/} Combined with "other hard hardwoods" in cubic-foot tables.

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